Section 2 - West Colorado River Basin
Executive Summary

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Executive Summary

This section summarizes sections 1 and 3 through 19 of the *West Colorado River Basin Plan*. This basin plan contains 19 sections and is modeled after the *State Water Plan* (1990). In addition, it contains Section A, Acronyms, Abbreviations and Definitions, and Section B, Bibliography. Individual sections should be studied for more detailed

2.1 Foreword

The *State Water Plan* provides a foundation for state water policy. This helps the state meet its obligation to implement programs to best serve the needs of the people.

More detailed plans have been prepared for the Bear River, Cedar/Beaver, Kanab Creek/Virgin River, Jordan River, Sevier River, Utah Lake and Weber River and Uinta Basin hydrologic basins. Plans of the remaining basins will be completed by late 2000. This plan was prepared under the direction of the Board of Water Resources.

The West Colorado River Basin is unique in that it is actually made up of five separate river drainages that flow into the Colorado River System. These are the Price, San Rafael, Dirty Devil (made up of Muddy Creek and the Fremont River), Escalante and Paria rivers.

2.3 Introduction

Water planning has always been a part of Utah's history. Preparation of this plan has involved many local, state and federal entities, as well as members of the public, who are involved in and have expertise in water resources.

The West Colorado River Basin is located in south-central Utah. It covers nearly 9.8 million acres (15,000 square miles) which contain large variations in topography, climate, soils and vegetation. Elevations range from 11,530 feet to about 3,700 feet with precipitation ranging from more than 30 inches to less than 8 inches. Growing seasons in agricultural areas range from 163 days at Green River to 88 days at Loa. The geologic parent materials provide a wide variety of soils producing vegetation from alpine conifer forest complexes to mostly desert shrubs and grasses. Private lands cover only about 8 percent of the area, while federally administered lands account for 86 percent and state lands 6 percent.

The West Colorado River Basin contains some of the nation's finest natural scenic areas including Capitol Reef National Park and portions of Bryce Canyon National Park, Canyonlands National Park, Glen Canyon National Recreation Area (Lake Powell) and the new Grand Staircase-Escalante National Monument. Three national forests and eight state parks are also located within the basin boundaries.

Although the Anasazi, Fremont and Sevier cultures may have irrigated land for crops as early as 1,500 years ago, livestock grazers from Sanpete County settling in Emery County in the late 1800's were the first modern irrigators. Settlements soon sprang up all around the basin along with small developments for culinary and irrigation water.

Construction of storage reservoirs became necessary to manage the basin's water resources around 1900. In 1917 Carbon County began to develop its water resources with the attempted construction of Mammoth Dam (100 feet downstream of Scofield Dam). This dam failed, but the first Scofield dam was completed in 1926 to irrigate about 25,000 acres near Price in Carbon County. The dam was eventually deemed unsafe, and the existing Scofield Dam was completed in 1946 as the first phase of the Bureau of Reclamation's (BOR) 1933 Gooseberry Project Plan. The BOR's Emery County Project was completed in 1966 and provides irrigation and power plant cooling water for much of western Emery County through Joes Valley and Huntington North reservoirs. Millsite Reservoir was funded by the Board of Water Resources and Department of Agriculture in 1971 as part of the SCS Ferron Watershed Project. This reservoir stores water used for agriculture, municipal and industrial uses around Ferron in Emery County. Utah Power completed Electric Lake in 1973 to provide water storage for the Huntington Power Plant.

Wayne County's largest storage projects began with the 1889 purchase of Fish Lake from the Paiute Indians. Johnson Valley Reservoir was built in 1899. Forsyth Reservoir was completed in 1917 to settle water right conflicts addressed in the 1902 McCarthy Court Decree. The Board of Water Resources financed the construction of Mill Meadow Reservoir in 1955. All of these store water for use in Rabbit Valley.

Garfield County's large storage reservoirs include Jacobs Valley, built in 1911 by the Pine Valley Irrigation Company, and Wide Hollow Reservoir, completed in 1954 by the New Escalante Irrigation Company. Both of these provide water for irrigation in and around Escalante.

Though not used for water storage in this basin, Lake Powell, located in Kane, Garfield and San Juan counties, provides 7.5 million acre-feet to the Lower Basin States (California, Nevada and Arizona) as required by the 1922 Colorado River Compact. This allows the Upper Basin States (Utah, Colorado, New Mexico and Wyoming), of which the West Colorado River Basin is part, to still develop its share of the river.

For the last 100 years, smaller water developments were built throughout the basin and provide numerous communities their existence. Even today, projects are still being planned and facilities built to make the best use of the water and related resources.

2.4 Demographics and Economic Future

The West Colorado River Basin is mostly controlled by the economics of the agricultural industry. However, in Carbon and Emery counties, coal mining, power production and government employment have the greatest impact on the regional economy. Price is the basin's largest city as well as the service and trade center for Carbon and Emery counties.

The 1998 population of the basin was about 38,400 people. The area is expected to grow to about 50,000 people by 2020. The annual growth rate is 1.2 percent, which is lower than the 2 percent overall state growth rate. Total job growth is expected to parallel the population. Presently, government services and trades are the leading employers. These will remain the leading employers in 2020. Also, tourism-related activities and employers will become bigger factors in the basin's economic future.

2.5 Water Supply and Use

Most of the water supply comes from precipitation in the five river drainages in the basin. This precipitation produces mainly surface water and some groundwater. Most of the precipitation is used directly by native vegetation (primarily in the upper watershed areas), some is also used by cultivated crops. Approximately 4.0 million acre-feet annually enter Lake Powell from the Green River, and 5.4 million acre-feet enter from the Colorado River. Over the last 20 years, about 10.7 million acre-feet annually has been released downstream through Glen Canyon Dam. Although flowing through the basin, very little of the water in

the mainstems of the Green or Colorado rivers is used in Utah.

Total basin yield of the West Colorado River Basin is 630,000 acre-feet. The five river drainages in the basin are the Price, San Rafael, Dirty Devil, Escalante and the Paria. All of these begin in the high elevations of the Wasatch, Fishlake, Awapa, Aquarius or Paunsaugunt plateaus and then flow down to enter either the Green or Colorado river systems. There are 13 exports out of the West Colorado River Basin that deliver 9,340 acre-feet of water to the Sevier River Basin. Another small export of about 100 acre-feet is delivered out of the Price River drainage to the Indianola area in the Utah Lake Basin. The major import to the basin is 4,800 acre-feet delivered to the Tropic area through the Tropic Canal from the East Fork of the Sevier.

Groundwater is not a significant part of the developed water supply of the West Colorado River Basin. The only exception is the Upper Fremont Valley in Wayne County where wells and springs supply agriculture and municipal needs. Other areas of the basin have small amounts of developed groundwater which are utilized mostly by small municipalities.

Total diversions for agricultural irrigation are 295,050 acre-feet; culinary use, 14,600 acre-feet; and secondary lawn and garden, 8,367 acre-feet. Industrial use is 36,292 acre-feet. The four power plants in Carbon and Emery counties use about 32,000 acre-feet of this total. After water is diverted for use, the unused portion returns to the various river drainages as return flow eventually entering the Colorado River System.

Water quality deteriorates in all five major drainages as the flows move downstream. Water quality in the upper reaches is good with total dissolved-solids of around 200 mg/L. This increased substantially to about 3,600 mg/L at the mouth of the Price River, 1,600 mg/L at the mouth of the San Rafael River, 2,000 mg/L at the mouth of the Dirty Devil, 900 mg/L at the mouth of the Escalante River, and 1,700 mg/L at the mouth of the Paria River.

2.6 Management

Management of the water resources became imperative when demands exceeded the average long-term supply. Storage reservoirs were built, beginning with Scofield Reservoir on the Price River, in order to save water during high flows for later use. There are several water users' associations and water conservancy districts throughout the West Colorado River Basin which assist with water management and development. More than 40 major water storage reservoirs have been built by water users. Twelve mutual irrigation companies in the basin serve more than 1,000 acres each and an additional 30 irrigation companies serve less than 1,000 acres each. Also, 92 public drinking water systems serve 95 percent of the basin's population. The remaining population uses its own private sources.

The Colorado River Salinity Control Program is a federally funded management plan to control the salinity in the Colorado River. The Price-San Rafael Rivers Unit included in this basin will improve irrigation water management and irrigation efficiencies in Carbon and Emery counties to the degree that 161,000 tons of salt will be prevented from entering the Colorado River System.

A real-time monitoring system has been installed by the Emery Water Conservancy District to more efficiently manage its water supply. The issue at the end of this section addresses the possibility for more real-time monitoring stations.

2.7 Regulation/Institutional Considerations

State agencies are required by law to provide administrative control and regulatory authority over the state's water resources. The state engineer (the director of the Division of Water Rights) has responsibility for administering the state water rights and for dam safety programs. Three area offices (Price, Richfield, Cedar City) cover portions of the West Colorado River Basin. Currently, there are 17 high hazard reservoir dams located in the basin that could cause considerable property damage and possible loss of life if they failed.

Other entities also have responsibilities for managing certain aspects of the water resources. These include mutual irrigation companies, water conservancy districts, special service districts, drainage districts, and cities and towns. These entities can levy taxes and assessments for their maintenance and operation of their facilities.

Water quality regulations are administered by the Water Quality Board and the Drinking Water Board. The divisions of Water Quality and Drinking Water (Department of Environmental Quality), respectively, are staff for these two boards.

Water is an important part of our environment, making it possible to have healthy lives and pleasing surroundings. It is important to improve or at least maintain the quality of the water resources in order to provide a good, clean water supply for human use and for wildlife habitat.

Problems associated with summer home areas around Scofield, Joes Valley and Boulder Mountain possibly deteriorating the water quality of these local groundwater basins by the use of septic tanks needs to be monitored and controlled. Coal mine operations intercepting underground water affecting local water entity supplies in Carbon and Emery counties is a major issue discussed in this section. Better coordination between the Utah Department of Environmental Quality and the Department of Natural Resources divisions of Oil, Gas and Mining and Water Rights is needed, as well as improved cooperation between local mining companies and water entities.

2.8 Water Funding Programs

Funds have always been needed to develop water resources. In the days of early settlement, most of the funds came from local sources. With the construction of the Gooseberry Project, Emery County Project and the Ferron Watershed Project, the federal government began to provide major funding. Later, the state began to fund many water developments through the Board of Water Resources and the Drinking Water Board. Other boards and programs were also involved.

Many state and federal programs have funding available for water development, using either grants or loans or a combination of both. More than $30 million of state funds and $200 million of federal funds have been made available for water resource development in the basin. Since loan funds have to be repaid, much of this investment eventually comes out of the pockets of the local users.

2.9 Water Planning and Development

Since agriculture and the power industry in Carbon and Emery counties are the largest water users, management of the river systems is centered around meeting these demands. Development of more storage is needed to provide better water management for some users with only direct flow rights. Water quality (primarily salinity) and irrigation efficiencies in the Price and San Rafael River drainages are problems. The Price-San Rafael Rivers Unit of the Colorado River Salinity Control Program is currently being implemented to aid water users with these problems.

Total depletions for all uses were about 205,100 acre-feet for 1998. This is expected to increase to about 229,000 acre-feet by the year 2050. The extra water to meet this increased demand is expected to come from more efficient use of the existing supplies and water rights recently obtained from Flaming Gorge Reservoir through the Board of Water Resources.

Some potential water projects that could increase basin water depletions include the Gunnison Butte Mutual Irrigation Project in Green River, the Narrows Project serving irrigated lands in Sanpete County, and the Lake Powell pipeline serving communities in Kane and Washington counties. The latter two projects would be exports out of the West Colorado River Basin.

Some environmental factors could affect future water development basin-wide. These include proposed wilderness areas, wild and scenic river designation, and the newly formed Grand Staircase-Escalante National Monument. Currently there are 1,731,000 acres of BLM wilderness study areas in

the West Colorado River Basin. An additional 1,523,000 acres are being considered.

Water education for young people is becoming more important. This is carried out through such programs as Project WET (Water Education for Teachers) and the Young Artists' Water Education Poster Contest. The goal of Project WET is to facilitate and promote awareness, appreciation, knowledge and stewardship of water resources. This is done by providing hands-on-training to public and private school teachers.

Major issues identified that could affect future water development and use in the basin are: 1) Preservation of potential reservoir sites, 2) proposed wilderness areas and wild and scenic rivers designations, 3) the need for long-range planning, and 4) draining Lake Powell.

2.10 Agricultural Water

Much of the economy of the West Colorado River Basin is centered around agriculture. The major agricultural operation is cow/calf and beef production. Most of the irrigated agriculture supports these operations.

The number of farms has decreased slightly over the years while the average farm size has increased. Presently, 295,050 acre-feet of water are diverted onto 91,924 acres of irrigated lands. About 285,050 acre-feet of this water is diverted from surface water supplies and 10,000 acre-feet from groundwater. The major crops are pasture, alfalfa, small grains, grass hay and corn silage. There is virtually no dry cropland in the West Colorado River Basin, although about 5,000 acres of irrigated pasture lands receive water only at the beginning of the irrigation season and remain dry thereafter.

Like most areas in Utah, the West Colorado River Basin does not have a full water supply for all the irrigable lands. Currently, 162,000 acre-feet is depleted annually. Problems with low on-farm application efficiencies affect some areas. In addition, overgrazing in the upper watersheds has caused some erosion problems. Increased water use efficiency and restoring and maintaining healthy watersheds can help to overcome these problems.

2.11 Drinking Water

About 60 percent of the 14,075 acre-feet annual public community drinking water supplies come from surface water treatment plants with the remainder from groundwater (either springs or wells). Systems are both publicly and privately owned, with 33 public community water systems and nearly 60 smaller public systems. These are all subject to the state and federal safe drinking water regulations.

Public community water systems delivered 10,504 acre-feet of culinary quality water during 1996. The basin-wide use was 253 gallons per capita per day, slightly lower than the 268 gpd state-wide average. Average use varied from 197 gallons per capita day in Emery County to 335 gallons per capita per day in Wayne County.

Future culinary water demands in the year 2020 will be over 19,000 acre-feet. Water to meet future demand will come from existing undeveloped rights for wells and springs. It is also possible that agricultural water rights will be converted to culinary use.

2.12 Water Quality

The highest water quality is found in the upper reaches of the drainages. As the water flows downstream in all of the basin's major drainages, the quality of the water deteriorates. The following water salinity data come from surface water measurements taken from recent studies: Price River near Scofield, 191 mg/l; Wellington, 1,585 mg/l; Price River at the mouth, 3,602 mg/l, Huntington Creek near Huntington, 193 mg/l; Cottonwood Creek near Orangeville, 227 mg/l; Ferron Creek near Ferron, 227 mg/l; San Rafael River near Castledale, 2,542 mg/l; Muddy Creek near Emery, 219 mg/l; Fremont River near Fremont, 123 mg/l; Fremont River near Caineville, 1,145 mg/l; Dirty Devil River near Hanksville, 2,043 mg/l; Escalante River near Escalante, 865 mg/l; and the Paria River near Glen Canyon, Utah, 1658 mg/l. The beneficial use classifications for the storage reservoirs and streams are mostly 2B and 3A. All water bodies had use Classification 4.

The Price, San Rafael and Dirty Devil rivers flow through areas of marine shales and sandstone surface geologic formations. Deep percolation from agricultural lands over the Mancos shale and saline soils and rocks can produce return flows having total dissolved solid levels approaching 4,000 milligrams per liter (mg/l).

The Price-San Rafael River Unit of the Colorado River Salinity Control Program would treat approximately 16,350 acres of farmland with gravity-pressure sprinkle irrigation, and about 9,650 acres with pump pressure sprinkle systems. This project will reduce salt loading to the Colorado River by 161,000 tons per year.

Two major issues discussed are the need for groundwater quality monitoring programs in the basin and specific monitoring of coal-bed methane gas industry saline water extraction and re-injection.

2.13 Disaster and Emergency Response

Natural disasters and other major emergencies are perennial problems. Water-related disasters are generally floods and droughts. Local governments have the responsibility to initiate the first action in response to a disaster or emergency. If an event is beyond the scope of local government, the governor can declare an emergency and make state assistance available. The Division of Comprehensive Emergency Management is the lead agency at the state level, coordinating state and, if necessary, federal assistance.

Flooding is the most frequent natural disaster. For this reason, flood-prone communities should have a flood insurance program in place. Flood plain maps have been prepared for most communities. Potential canal breaks above some communities could be a problem. Droughts can also have a disastrous impact, especially in prolonged situations.

Two major issues presented in this section concern flood plains and flood prevention. It is recommended non-participating communities should become qualified under the National Flood Insurance Program and establish flood water control committees. Another issue discusses the need for each county to prepare a drought response plan.

2.14 Fisheries and Water-Related Wildlife

A wide diversity of fish, wildlife and plant species is found in the basin, interacting to contribute to a fairly well-functioning ecosystem. Ten threatened or endangered species are found in the West Colorado River Basin. The basin supports 27 different species of sport fish. These range from trout at higher elevations of the drainages to warm water species at the lower elevations of Lake Powell. The Colorado River cutthroat trout is the only native sport fish, and the distribution of these fish in this basin is extremely limited. Recovery efforts are under way to restore this fish species in the West Colorado River Basin.

The Colorado and Green rivers, located within the basin, contain four endangered fish. These are the Colorado pikeminnow, humpback chub, bonytail chub and the razorback sucker. Utah, Colorado and Wyoming; the federal government; water users; and environmental groups have joined to create the Upper Colorado River Basin Endangered Species Recovery Program. The goal is to implement a program to recover and de-list these fish. The Utah Division of Wildlife Resources (DWR) currently manages Lake Powell as a sport fishery with inflowing tributaries managed for native fish. This reservoir receives more angling pressures than any other water in the basin.

Wetland areas provide food, cover and nesting sites for wildlife. The basin contains many acres of wetlands including about 26,000 acres of man-made wetlands located within irrigated cropland areas. The two managed wetlands in the West Colorado River Basin include Desert Lake Waterfowl Management Area near Emery in Emery County and Bicknell Bottoms near Bicknell in Wayne County.

Major issues discussed include: 1) The DWR should use best management practices to protect and enhance identified significant wetland and riparian areas, 2) a management plan should be set up to provide instream flows in Lower Fish Creek below

Scofield Reservoir, 3) conservation pools should be purchased to protect against winter fish kills in the basin's many storage reservoirs, 4) fish eradication and stocking projects should be conducted on these basin waters where introduced exotic fish species have negatively impacted populations of native fish, 5) private pond owners should follow established state policies to prevent the expansion of whirling disease, 6) coordination among all interested groups is needed in planning for future growth to offset the demand that tourism and increasing population is having on fish and wildlife resources in the state.

2.15 Water-Related Recreation

The reservoirs, clear streams, alpine scenery and world-class red rock plateaus of the West Colorado River Basin are prime attractions. Water is often the focal point for outdoor recreation whether it is involved directly or just part of the setting. Glen Canyon National Recreation Area, which contains Lake Powell, is a world class boating, swimming and fishing destination. The other federal parks, including Capitol Reef National Park, Bryce Canyon National Park, Canyonlands National Park and the new Grand Staircase-Escalante National Monument, all contain some water-related recreational opportunities. Also, the Division of Parks and Recreation (DPR) manages eight state parks in the basin, all having water as an on-site use or amenity. Local community parks are an important part of the scene, as are other federal recreation areas. Recreation visits to the West Colorado River Basin are popular and are increasing at an accelerating rate.

Two major issues discussed include: 1) The DPR and recreationists should obtain ideas to determine ways to reduce conflicts by unethical behavior in recreational settings, and 2) the DPR should continue to prepare and update management plans to achieve and balance the future use of water resources for recreation.

2.16 Federal Water Planning and Development

The federal role and involvement in planning and development is changing. Many past activities concerned development of the resource, but they are now oriented toward conservation and protection. The main concern is the part federal agencies should play, compared to state and local involvement. Coordinated planning and use is needed, especially with the large land areas which are administered by the federal government.

Major local projects with federal agency involvement include assistance with the real-time monitoring network by the Bureau of Reclamation, Glen Canyon Adaptive Management Workgroup, and watershed protection and flood prevention projects by the Natural Resources Conservation Service.

2.17 Water Conservation

Conservation is one of the most economical ways to make an existing water supply go farther. In many cases, it can be achieved without sacrificing our existing lifestyles. Water conservation was a way of life in the early days of settlement; it needs to be made a part of our lives again.

The culinary water use for 1996 in the West Colorado River Basin was 253 gallons per capita day (gpcd). This is under the statewide average use of 268 gpcd. Secondary water use for 1996 was 196 gpcd, compared to 56 gpcd statewide. The total per capita use is 449 gpcd, compare to a statewide average of 324 gpcd.

Several water conservation methods can be implemented. Conservation of irrigation water can be achieved through improving efficiencies. Culinary water use can be reduced by using low volume plumbing fixtures, increased outside watering application efficiencies, not watering during the day, replacing high water-using landscapes with vegetation using less water, and changing price rate structures. Also, education on water availability and use is another way to assure future generations will find the need for conservation.

Only one major issue is discussed. Local water providers should adopt water rate structures to encourage water conservation.

2.18 Industrial Water

Self-supplied industries are major water users in Carbon and Emery counties and an important part of the total water supply. Total self-supplied industrial water use is 36,292 acre-feet, of which 4,092 acre-feet is potable. Public community systems provide 359 acre-feet of the potable amount. Of the four coal-fired power plants operating in the basin, three are owned by Pacific Corp and one by Sunnyside Cogeneration Associates. Also, a small hydroelectric plant near Boulder is owned by GarKane Power.

Industrial requirements for water are not expected to increase significantly in the future. Future water requirements will total 41,310 acre-feet in 2020. Most of these increases will be for light industries using culinary water from existing public water suppliers.

2.19 Groundwater

Groundwater is not a major source of water in the West Colorado River Basin. This is due to several reasons: 1) The general absence throughout the basin of productive and easily developed alluvial aquifers, 2) the unfractured consolidated aquifers generally have hydraulic properties that are not conducive to large-scale groundwater development, 3) the quality of the groundwater in many parts of the basin is unsuitable for domestic, municipal, and/or agricultural uses, and 4) the economics of drilling and pumping water from deep buried consolidated aquifers is uneconomical for many of today's uses.

The West Colorado River Basin contains 4,900 springs and 1,386 wells. Average withdrawals from groundwater are 17,871 acre-feet. The quality of groundwater varies from good to poor, depending on the location and depth. Wells used for culinary purposes penetrate the deeper, better quality aquifers while those used for irrigation water are of lesser quality.

Past studies indicate there may be several million acre-feet of water in the Navajo Sandstone. This 400 to 1,600 feet thick aquifer underlies most of the West Colorado River Basin. More studies are needed to determine the quantity and quality of this future water source, as well as an economic analysis to determine its viability. ●